

REMARKS

This is a full response to the outstanding non-final Office Action mailed October 31, 2006. The Examiner is thanked for the thorough examination of the present application. Upon entry of this response, claims 1-20 are pending in the present application. Claims 1-3, 5, 7-8, 11-13, 15, and 17-18 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Decker* et al. (U.S. Pat. No. 4,980,897, hereinafter "*Decker*") in view of *Cole* (U.S. Pat. No. 5,86,825). Claims 4, 6, 14, and 16 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Decker*, in view of *Cole*, further in view of *Wei* (U.S. Pat. No. 4,713,817). Claims 9, 10, 19 and 20 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Decker*, in view of *Cole*, further in view of ITU-T G.992.1.

Applicant respectfully requests consideration of the following remarks contained herein. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

I. Response to Claim Rejections Under 35 U.S.C. § 103

Claims 1-3, 5, 7-8, 11-13, 15, and 17-18 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Decker* in view of *Cole*. Claims 4, 6, 14, and 16 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Decker*, in view of *Cole*, further in view of *Wei*. Claims 9, 10, 19 and 20 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Decker*, in view of *Cole*, further in view of ITU-T G.992.1. For at least the reasons set forth below, Applicant traverses these rejections.

Independent Claim 1

Claim 1, as amended, recites (emphasis added):

1. (Currently Amended) A method of encoding Quadrature Amplitude Modulation (QAM) trellis coded data signals, comprising:
receiving data bits and inputting into a Trellis encoder;
encoding some of the received data bits using a Trellis state machine;
employing a 4/5 convolutional encoder to encode the data bits;
generating a redundant data bit u_0 using a six stage state machine;
mapping all of the data bits onto a constellation according to the equations:

$$v'_2 = u_5$$

$$v'_1 = u_1 \oplus u_3$$

$$v'_0 = u_3$$

$$w'_2 = u_4 \oplus u_5$$

$$w'_1 = u_0 \oplus u_1 \oplus u_2 \oplus u_3$$

$$w'_0 = u_2 \oplus u_3$$

wherein u_1, u_2, u_3, u_4 are the encoded bits; u_5 is an uncoded bit, u_0 is the redundant bit, and wherein $v'_0, v'_1, v'_2, w'_0, w'_1, w'_2$ are input into discrete multi-tone (DMT) bins; and

forcing the Trellis state machine to return to zero state.

Applicant respectfully submits that independent claim 1 patently defines over *Decker* in view of *Cole* for at least the reason that the combination fails to disclose, teach or suggest the features emphasized below in claim 1. Specifically, the combination fails to teach the mapping relationship expressed by the equations above. Applicant submits that the amendment to claim 1 was made to clarify certain novel features and that no new matter is added by the amendment.

In rejecting claim 1 under §103(a), the Office Action relies primarily on the *Decker* reference to teach most of the elements recited in claim 1. The Office Action alleges that *Decker* teaches “mapping all of the data bits onto a constellation (Fig. 4, signal mapper 72; column 5, lines 47-62).” (See Office Action, p. 2.) Applicant respectfully submits that the amendment to claim 1 renders the rejection moot as

Decker fails to disclose the mapping equations provided in claim 1. The text passage cited by the Office Action is shown below:

According to FIG. 4, trellis encoding is performed as follows. The trellis encoder 70 consists of a finite-state encoder 71 and a signal mapping look-up table 72. The input to the trellis encoder 70, which is also the input to the finite-state encoder 71, consists of m binary bits on lines 73. These bits may be designated $x_m, \dots, x_{k+1}, x_k, \dots, x_2, x_1, x_m$ being the most significant bit (MSB) 74. The finite-state encoder expands the m input bits 73 into $m+1$ coded bits 75 using a rate $k/(k+1)$ ($k \leq m$) binary convolutional encoder 76 to encode the k least significant input bits 77. The $m+1$ bit output 75 of the finite state encoder 71, which may be designated $x_m, \dots, x_{k+1}, z_k, \dots, z_2, z_1, z_0$ 78, is applied to the signal mapping look-up table 72 to pick a point (X,Y) 79 in a 2^{m+1} point constellation. Subsets 80 are discussed in the description of the multi-channel trellis decoder.

(Col. 5, lines 47-62). As shown in the cited text passage, *Decker* fails to teach of mapping the data bits according to the expressions provided in claim 1 above.

Accordingly, Applicant respectfully submits that independent claim 1 patently defines over *Decker* in view of *Cole* for at least the reason that the combination fails to disclose, teach or suggest the highlighted features in claim 1 above.

Dependent Claims 2-10 are Patentable

Applicant submits that dependent claims 2-10 are allowable for at least the reason that these claims depend from an allowable independent claim. See, e.g., *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

Independent Claim 11

Claim 11, as amended, recites (emphasis added):

11. An apparatus for encoding Quadrature Amplitude Modulation (QAM) trellis coded data signals, comprising:

- a Trellis encoder for receiving data bits to be inputted therein;
- a Trellis state machine for encoding some of the received data bits;
- a 4/5 convolutional encoder to encode the data bits;
- a six stage state machine for generating a redundant data bit; and
- a mapper for mapping all of the data bits onto a constellation,

wherein the mapper maps according to the equations:

$$v'_2 = u_5$$

$$v'_1 = u_1 \oplus u_3$$

$$v'_0 = u_3$$

$$w'_2 = u_4 \oplus u_5$$

$$w'_1 = u_0 \oplus u_1 \oplus u_2 \oplus u_3$$

$$w'_0 = u_2 \oplus u_3$$

wherein v'_0 , v'_1 , v'_2 , w'_0 , w'_1 , w'_2 are input into discrete multi-tone (DMT) bins, u_1 , u_2 , u_3 , u_4 are the encoded bits, u_5 is an uncoded bit, and u_0 is the redundant bit.

On page 4, the Office Action asserts the same arguments used in rejecting claim 1 to reject claim 11. Again, Applicant respectfully submits that the amendment to claim 11 renders the §103 rejection moot as neither *Decker* nor *Cole* disclose a mapper that maps according to the equations given above. Accordingly, Applicant respectfully submits that independent claim 1 patently defines over *Decker* in view of *Cole* for at least the reason that the combination fails to disclose, teach or suggest the highlighted features in claim 1 above.

Dependent Claims 12-20 are Patentable

Applicant submits that dependent claims 12-20 are allowable for at least the reason that these claims depend from an allowable independent claim. See, e.g., *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

II. Prior Art Made of Record

The prior art made of record has been considered, but is not believed to affect the patentability of the presently pending claims.

CONCLUSION

Applicant respectfully submits that all pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 50-0835.

Respectfully submitted,

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